UNITED STATES
LIGHTHOUSE SOCIETY

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Chronology of Lighthouse Events by Thomas Tag

INTRODUCTION

The following document is a chronology of the major technical events that occurred in lighthouse development throughout time, from the earliest entry of 1300 BC to the last recorded event of 1990.

The document is broken down into major time periods as follows:

Chronology prior to 1800

The period 1800 to 1849

The period 1850 to 1899

The period 1900 to the present

Each line item identifies a specific important event in lighthouse history.

CHRONOLOGY BEFORE 1800

1300 BC The Trojans built an early fire tower or lighthouse at Sigeum.

280 BC The Pharos of Alexandria was completed in Egypt.

280 BC The building of the Colossus of Rhodes was begun in the eastern Mediterranean on the Island of Rhodes.

40 Caligula built a stone tower lighthouse at Boulogne in Gaul (now France).

50 The Romans built a fire beacon at Ostia, one of their more significant ports.

53 The oldest lighthouse in England was built by the Romans at Dover.

1200 First recorded use of Navigation Buoys in Guadalquivir River Seville, Spain.

1280 The church of Brielle in the Netherlands gave permission for the establishment of two ‘fire beacons’ at the mouth of the Meuse estuary.

1323 Small light at St. Catherine’s on the Isle of Wight in England.

1400 Cresset - A hollowed out stone bowl filled with oil and a wick was used at St. Michael's Mount lighthouse in England.

1400 A navigation light was built in Venice that burned oil.

1500 Wood burnt until around 1500 then coal took over.

1500 Early 1500s use of coal as a fuel.

1514 Charter granted to Trinity House by Henry VIII.

1532 The earliest use of reflectors was on the Baltic Sea at the Lighthouse of Gollenberg which had a single candle lamp backed by a metal reflector.

1540 Coal fire light at Tynemouth England.

1540 First use of candles in England, at North Shields.

1566 Trinity House given Seamarks charter.

1571 Leonhard Digges, in England, used a parabolic reflector to ignite gunpowder at a distance.

1584 Cordouan lighthouse tower construction began at mouth of Gironde in France. This tower replaced a small structure.

1607 First Trinity House light.

1611 Cordouan Lighthouse, in France was completed.

1614 Caligula's stone tower lighthouse at Boulogne fell down.

1616 The first English lighthouse to use mined coal was Dungeness.

1618 First double tower light to provide a distinctive characteristic in England was at Wintertonness.

1624 Jens Pedersen Groves in Denmark invented the Vippefyr or lever light in which an iron basket containing burning coals was raised, very simply by a lever, some 14 to 30 feet above ground level or above the top of a tower.

1635 German Feuerwuppe was invented; it was their version of the Vippefyr.

1636 Isle of May light established in Scotland using coal as an illuminant.

1650 Vippefyr light established near Skagen Harbor in Denmark.

1660 Johan D. Braun designed and manufactured cast-steel reflectors in Sweden.

1665 The Royal Glass Works, for runner to the Saint Gobain Glass Works is established in France. Saint Gobain is the major producer of glass for Fresnel lenses.

1669 Use of reflector at Landsort lighthouse in Sweden.

1673 The beacon at Point Allerton, Massachusetts, was illuminated with 'fier bales of pitch and ocum.'

1680 One of the first lighthouses with an enclosed lantern was built at St. Sgnes in the Scilly Islands of England.

1681 J. D. Braun given Swedish patent for steel mirrors.

1687 The lighthouse of Orskar, in Sweden had six large reflectors, shape unknown, with two lamps each.

1699 Tallow candles used at Eddystone in England.

1710 Metal reflectors were used in Germany at Travemünde.

1716 Lighthouse on Little Brewster Island Boston lighted by Tallow Candles, followed later by Spider Lamps.

1717 Wood burning Fire Basket in use at Cordouan, France is converted to the burning of coal.

1719 First fog signal in America was a cannon at the Boston Lighthouse on Little Brewster Island.

1726 Lighthouse established by Zaccheus Lumbert at Tarpolin Cove on Naushon Island, MA.

1727 Monsieur Bitry rebuilt the lantern at Cordouan, in France. It burned 225 pounds of coal a night. He created an inverted cone in the ceiling that projected downward 3 feet and covered its surface with tin plates to form a reflecting surface.

1730 First use of oil in British lighthouses was about 1730.

1731 Robert Hamblin succeeded in obtaining a patent for the use of lightships for lighting of the British coasts. The patent granted to Hamblin was revoked shortly after its issue.

1732 David Avery succeeded in establishing friendly relations with Trinity House, and with its co-operation put the Nore Sand Lightship in position. This was a small vessel fitted with a number of little flat-wick lanterns fixed at the extremities of the yardarms. The light produced was dim and frequently blew out.

1734 First Canadian lighthouse at Louisbourg Nova Scotia.

1736 Copper reflectors used with candles at North Shields in England.

1738 A flashing light was invented by Jonas Norberg in Sweden with about 500 candlepower. It was abandoned because it produced too much condensation and tended to freeze up in winter.

1738 The first mention of a parabolic reflector suggests that five parabolic Braun cast-steel reflectors, each with from two to six lamps were installed at the Orskar lighthouse in Sweden.

1748 G.L.L. Buffon suggested reducing the thickness of a lens by grinding out steps in concentric zones with each step shaped to the curvature of the original lens.

1750 Polished brass reflectors were installed at the Korso light in Sweden.

1752 Large convex lenses were built into the lantern glass at South Foreland in England.

1752 Lizard Light built, in England, with 4 towers burning coal.

1753 A moving screen was used at Uto in Sweden to alternately light two separate channels from one light source. This light is also reported to have used mirrored reflectors.

1755 Small lenses were actually applied in several lighthouses in England and Ireland.

1757 Air whistle and trumpet powered by a horse used at Beaver Tail lighthouse in Rhode Island.

1757 Jonas Norberg experimented at the lighthouse at Korso Sweden with reflectors rotated back and forth by hand (oscillated) to produce flashes. Norberg's reflectors were parabolic and eight inches in diameter.

1759 Smeaton first used flat wick lamps in Eddystone, however, they failed due to smoke build up in the lantern room.

1759 Smeaton's Eddystone Lighthouse was fitted with twenty-four tallow candles.

1763 Irish Ballast Board created.

1763 The first scientifically designed parabolic reflectors were a design by Mr. Hutchinson of Liverpool England. Hutchinson's 1763 reflectors had a 'spreading burner.' The size of the burner was 3 inch for reflector 3 feet, 12 inch for reflectors 7 ½ feet, 14 inch for reflector 12 feet. The wicks were trimmed every 4 hours.

1763 Light at Leasowe in England used a coal fire.

1764 Spider lamp burned fish-oil using a solid wick with the lamp suspended by iron chains from the lighthouse dome. Used at Sandy Hook, in America starting in 1764. It had 48 lamps burning oil.

1765 Lavoisier, in France, proved that a parabolic reflector, with a light source at its focal point, was the best way to concentrate light into a beam and to direct it as needed.

1766 First recorded fog signal using a bell at Nidingen, Sweden.

1767 First buoy in U.S., wooden cask buoys, used in Delaware River.

1767 John Smeaton designed a Swape 'Lever Light' for Spurn Point in England.

1769 Jonas Norberg experimented at the lighthouse at Orskar, Sweden with improved reflectors rotated back and forth by hand (oscillated) to produce flashes.

1770 Teulere's reflectors began use in France.

1770 William Hutchinson designed a dual tin reflector with a single two-spout lamp.

1771 Pierre Tourtille-Sangrain, in France, invented a spherical reflector with two burners.

1772 Bidson Hill near Liverpool, in England had a wooden tower where Captain Hutchinson tested his reflecting mirror for Lighthouses. In 1772 he was paid 20 guineas for his reflecting lights used at the lighthouses of this port. This was Hutchinson's largest reflector at thirteen and a half feet diameter.

1772 A large brass reflector was installed at the Harwich high light, in England behind a coal fire.

1773 The ribbon wick was invented by Monsieur Leger.

1773 Pierre Tourtille-Sangrain's reflectors were first installed at the lighthouse at St. Mathieu, France.

1775 Proposal to show a green light at the Smalls lighthouse, in England was the first use of a colored light in England.

1776 Ezekiel Walker rebuilt the Hunstanton lighthouse, in England and installed lamps with 18-inch parabolic reflectors made of pieces of mirror glass.

1776 John Smeaton designed a funnel chimney to provide a draft for the coal fire at the high light at Spurn Point, in England.

1777 Navigation Bell (for fog) at Bamburgh Castle North Humberland, in England.

1778 Spangle light at Lowestoft, in England, had a special concave drum reflector with 4000 glass facets.

1779 Three copper lamps and reflectors were ordered by the Trinity House for the Casquet lighthouses, in England.

1780 The first use of Wooden Spar Buoys, in America, was made in Boston Harbor.

1780 Spherical Reflectors were under test in France.

1780 Borda proposed the use of a reflecting circle, in France.

1780 The first attempt at the construction of Buffon's idea of a one-piece lens made in concentric zones was made by the Abbé Rochon, in France.

1780 First attempt to use coal gas by Trinity House, in England.

1780 François-Pierre Amié Argand began work on the hollow or double air current wick lamp with a tubular chimney, as well as simple reflectors and wick lifting mechanisms.

1781 Jonas Norberg succeeded in manufacturing a rotating light. This gave the possibility to give each lighthouse its own character. He arranged reflectors on a stand rotated by a clockwork. First lighthouse with a revolving beam using the Jonas Norberg system was at the Carlsten lighthouse near Marstands, Sweden. This was a reflector system with three oil lamps and each lamp had 2 reflectors associated with it.

1781 Coal oil was proposed as a fuel for lamps.

1781 Spherical reflectors with oil lamps were installed at La Heve, in France.

1781 Trinity House used oil lamps with reflectors at the Casquet lighthouse, north of Guernsey in England.

1782 Cordouan lighthouse coal fire replaced with 80 spherical reflectors and lamps with flat wicks by Tourtille-Sangrain. The light was so poor that mariners earnestly requested a return to the old coal fire.

1782 Lemoyne suggested using lights that flashed at regular intervals, every lighthouse having its own distinguishing rhythm.

1782 François-Pierre Ami Argand completed his basic lamp design.

1782 British construct a lighthouse on the Great Lakes at Fort Niagara.

1783 Joseph Teulere proposed the use of improved parabolic reflectors and lamps in France.

1783 Jan Pieter Minckelares invented a way to produce coal gas.

1784 Joseph Teulere's reflector was built by J. C. Borda and was first installed at the Dieppe Lighthouse in France. It used 5 parabolic reflectors based on the Jonas Norberg rotating system. J. C. Borda, created true parabolic reflectors using Argand lamps. Borda also invented the use of reflector lamps mounted in several tiers on square or polygonal frames that were turned on a vertical central shaft, creating a revolving characteristic for the lighthouse.

1785 Wicks woven in stocking form (hollow) began to appear for use in Argand lamps.

1785 A rotating reflector light based on the Jonas Norberg design was installed at Liverpool, England.

1785 Benjamin Thompson, known as Count Rumford, invented the first multiple wick lamp.

1786 Northern Lighthouse Board authorized in Scotland by act of Parliament.

1786 One of Thomas Smith's earliest lamps for lighthouse use consisting of an Argand style lamp and a parabolic reflector made of polished tin was put on trial at Inchkeith lighthouse, in Scotland.

1786 New Swape Light (a kind of Vippefyr) at Spurn Point, in England, used coal till 1816 then the Swape was removed and replaced by a lighthouse with reflectors.

1786 Lenses were installed at Portland Bill, in England sometime between 1786 and 1790 by Thomas Rogers. They were 21 inches in diameter and 5 ½-inches thick. The lamp flame was 3 inches in diameter and behind the flame was placed a glass spherical reflector 12 or 18 inches in diameter that was silvered over on its convex side with quick silver. These lenses were also used at the Hill of Howth and at Waterford, in Ireland.

1786 Thomas Smith began making tin reflectors.

1786 Thomas Smith developed reflectors with a new design. They were octagonal 12 inches in diameter made of 48 pieces of mirror glass.

1787 First Scottish use of large (18-inch) reflectors made of mirror glass set in plaster by Thomas Smith. (at Kinnaird Head lighthouse) The reflectors were larger than his original 1786 design, composed of 350 facets of silvered glass.

1787 Ambroise-Baunaventure Lange invented the constricted lamp chimney that provided additional outer airflow across the wick increasing the brilliance of the flame.

1787 The Guyton de Morveau invented the first use of multiple concentric wicks in a lamp.

1787 Peter Kier invented the Hydrostatic lamp, where a heavy liquid flows below the oil to raise it to the wick.

1788 The Marquis Antoine de Condorcet suggested building a reduced thickness lens based on Buffon's principles but made from an aggregate of separate rings.

1788 Trinity house first adopted silvered parabolic reflectors and Argand burners at the Portland lighthouse. This was the first use of Argand lamps in England.

1788 First use of a rear spherical mirror to direct light forward through the flame by Thomas Rogers. Thomas Rogers' spherical glass reflectors were made of blown-glass-half spheres made into mirrors. Alan Stevenson proposed in 1834 to make similar mirrors.

1788 Thomas Rogers designed lenses 21 inches in diameter and made by grinding down a single slab of glass. His lenses were five inches thick.

1789 First U. S. Congress passed law establishing the American Lighthouse Service. Congress' 9th act took over all Colonial lighthouses.

1789 Thomas Rogers invented a plano-convex lens with his partner George Robinson, an optical expert that was used at the Portland Low Light, in England. This made the Portland Low Light the first lighthouse in the world to use a magnifying optical lens.

1790 The first revolving reflector light was established at the St. Agnes lighthouse on the Islands of Scilly, in England.

1790 Monsieur Guinand in France first produced a true optical glass lens of nine inches in diameter.

1790 J. C. Borda built the 24 reflector and lamp system for Cordouan lighthouse and installed it in 1790 after the lighthouse was rebuilt by Joseph Teulere. This reflector system used the Jonas Norberg rotating design. Cordouan lighthouse in France began using a rotating light, with parabolic mirror metallic reflectors. Monsieur Lenoir made the reflectors used at Cordouan from steel faced with 3 or 4 leaves of silver. The lamps used were made by Monsieur Quinquet and had no chimneys.

1790 Mr. Lincoln in Boston proposed a solution to smoke within the lantern room. He redesigned the ventilator and added holes around the lantern room for incoming air and provided an air inlet below the lamps.

1790 Spider lamps (a pie shaped pan of oil from which 4 wicks protruded. There were four such pans) were used at Boston light, in America. They gave off acrid fumes and continued in use until 1812.

1791 Beacon on Baker's Island, in Boston harbor, built by Salem Marine Society.

1791 The New London lighthouse, in America was lighted by three spider lamps with three solid wicks in each.

1792 The French Lighthouse Service put under the Ministry of Marine.

1792 Cape Henry lighthouse, in America used 8 bucket lamps in two tiers each with 8 quarts of Herring oil.

1792 Captain Richard Walker designed parabolic reflectors made on a wooden frame coated with plaster into which 721 pieces of mirror-glass were set. The reflectors were installed at the Walney light, in England.

1792 Records mention three floating beacons in the Chesapeake Bay, in America.

1793 President George Washington approved a contract for a floating beacon for the Delaware River.

1794 American, Sir Benjamin Thomson who was also known as Count Rumford, designed a version of the Argand lamp that produced 12 candlepower.

1795 Ezekiel Walker described how to set mirror facets into a parabolic plaster shell. He used one-half inch long facets of mirror glass tapering in width arranged in long rows and fixed in position with varnish and white lead.

1796 First use of polished-metal-parabolic reflectors in Germany at Memel (now in Lithuania)

1797 An Act of Congress provided for 16 buoys for Boston Harbor, in America.

1798 Eclipser installed at Cape Cod lighthouse built by John Bailey of U.S. showed light for 50 seconds and then dark for 30 seconds used a screen revolving around the oil lamps so that their light would be obscured at intervals operated by clockwork.

1799 Bernard-Guillaume Carcel invented the pump style lamp. This lamp used the oil overflow principle to help cool the wick especially in multi-wicked lamps. It had a double piston operated by clockwork, which forced oil through a tube to the burner.

1799 Phillip LeBon d'Hambersin, in France, was given patent in 1799 for making illuminating gas from wood. He called his invention the Thermo Lamp. The Thermo Lamp was first used in the lighthouse at Le Havre in the same year.

CHRONOLOGY FROM 1800 TO 1849

1800 Light began to be measured, in France, using its equivalent in Carcel burners.

1800 Gas from carbonizing wood used at lighthouse in Porkkala, Finland.

1800 Cast iron lighthouse proposed by Rennie for Bell Rock.

1800 Early experiments with Coal gas by Trinity House in England.

1800 Dr. Van Marum invented a lantern ventilation system.

1801 First experiments with the electric arc light were conducted, in England, by Johann Ritter and Sir Humphry Davy.

1801 The Harwich Lighthouse, in England used a flat brass plate as a reflector behind a coal fire.

1801 Revolving light producing 3 flashes was built at St. Agnes, in England.

1801 The last glass facet reflector was built in Scotland by Thomas Smith.

1801 Bordier-Marcet purchased Argand's lamp factory in France.

1802 Argand invented a reflector with two curves, one parabolic and one an ellipsoid. This was proposed by Argand for use in lighthouses, but was abandoned in 1803.

1802 Humphry Davy showed the Royal Society in England that a platinum wire heated by electricity produced light.

1803 Porpoise oil tested at the Cape Hatteras lighthouse, in America.

1803 First Scottish use of polished silver-plated parabolic reflectors and Argand burners was made by Robert Stevenson at Inchkeith lighthouse.

1803 Early cast iron lighthouse was built at Swansea, in England.

1805 Coal gas tried with reflector behind the flame by Trinity House.

1805 French lighthouse Service put under Commissioners of Roads and Bridges.

1806 First use of red color characteristics in a lighthouse optic was invented by Benjamin Milne in England and installed at the Flamborough Head lighthouse, England.

1806 Hydrogen gaslights were experimented with in England.

1807 George Robinson installed lenses 4 ½ inches in diameter in front of the flame of the Argand lamps at the Flamborough lighthouse, in England.

1807 Robert Stevenson invented lightship lantern that surrounds the mast, which was first used on the lightship located at the Bell Rock lighthouse, Scotland, construction site.

1807 George Robinson became consultant engineer to Trinity House.

1808 The electric arc light was demonstrated by Sir Humphry Davy.

1808 Bordier-Marcet invents the ‘fanal a double effet’ reflector.

1809 Robert Stevenson designs reflector/lamp where lamp can be lowered to polish and clean the reflector. Also invented drip cup to collect surplus oil, frost lamp to liquefy oil, 24-hour oil supply.

1809 Robert Stevenson began trials of various colors for distinguishing lighthouses. He tried red glass chimneys and green glass sheets as well as other colors.

1809 Bordier-Marcet invents the ‘fanal sidereal’ reflector.

1809 Thomas Rogers installed lenses in front of the Argand lamps at the Holyhead lighthouse in Wales. These were the lenses seen and probably copied by Winslow Lewis for use in America.

1809 Monsieur De La Rue placed a helical shaped platinum wire in a vacuum inside a sealed glass tube and applied electricity producing the first experimental incandescent light bulb.

1810 Original patent by David Melville for a gaslight.

1810 Robert Stevenson experiments with small lenses very similar to those used by Robinson. He also experiments with a larger red glass lens, however the experiments prove that this style of lens is of no value.

1810 Winslow Lewis designed a crude Argand style lamp with a crude parabolic reflector and lens assembly. U.S. Patent no. 1305-X.

1810 Control of the Irish lights is given to the Ballast Board in Dublin.

1811 Sir David Brewster suggested building a large lens from an aggregate of pieces of separate rings for use as a burning lens. He did not pursue his design and no attempt was made to actually produce a lens of pieces of separate rings.

1811 A Commission on Lighthouses was appointed in France on April 29, 1811.

1811 Robert Stevenson invented a vertically opening screen to create a flashing characteristic.

1811 The Bell Rock lighthouse was completed in Scotland using newly designed silvered metal reflectors by Robert Stevenson.

1811 Robert Stevenson designed an apparatus for automatically tolling a bell on a buoy at the Bell Rock.

1812 Bordier-Marcet patented the Fanal Sidereal reflector in France.

1812 Brewster's treatise on Burning Instruments was published in 1812.

1812 Winslow Lewis Patent ‘Reflecting and Magnifying Lantern’ was sold to the U.S. Government for $20,000 and became the standard American lamp and reflector until 1852. The Lens was bottle green 9 inches diameter and 2 and a half to 4 inches thick.

1813 Improved patent for gas light for use in lighthouse by David Melville.

1814 Lighthouse in Uto Finland had a huge parabolic frame of wood covered with small pieces of mirror glass moved by hand to different positions (oscillating).

1816 The last coal fire in Scotland was discontinued on the Isle of May.

1817 Coal gas used to light Beavertail lighthouse at Newport RI, using David Melville's system. This was the first known use of Coal gas in a lighthouse.

1817 David Melville invents an oil heater for use with Winslow Lewis lamps.

1818 Coal gas first used at lighthouse at the Salvore lighthouse, near Trieste, Italy.

1818 In Britain a rotating four-sided box punched with letters of the alphabet is designed for lighthouse characteristic, by T.S. Peckston.

1818 First American-built lighthouses on the Great Lakes at Buffalo NY and Presque Isle (Erie) PA.

1819 Bordier-Marcet invents fanal sidereal reflector.

1819 Fresnel on June 21, 1819 first began his work in the French lighthouse commission.

1819 Fresnel completes his first report on optics for lighthouses on August 29, 1819 just two months after starting work on the project.

1819 Fresnel began the design of a large 3-foot diameter lens that was built by Soleil. It was used by Arago and Matieu in the trigonometrical survey of France. Later in 1821, it was used at Cape Grisnez, in France.

1819 Fresnel and Arago invented the multiple concentric wick lamp, using the Carcel clockwork pumps.

1819 Siren invented by Charles Cagniard de La Tour.

1820 The last glass facet reflectors in Scotland were removed and replaced with silvered metal reflectors.

1820 Fresnel began to design a lighthouse lens.

1820 The first American Lightship in Chesapeake Bay off Craney Island near Willoughby Spit.

1820 Stephen Pleasonton appointed fifth auditor of the treasury in charge of American navigational aids.

1820 First use of Oil gas at Holyhead in Wales.

1820 First bell fog signal in America at West Quoddy Head in 1820.

1821 Fresnel completed the design of the first bulls-eye panel for a first-order lens.

1821 Fresnel and Arago invent burner with multiple concentric wicks.

1821 On November 1, 1821, Colonel Colby wrote to Robert Stevenson informing him of Fresnel's lens and lamp designs and experiments in France.

1822 Last light to burn Coal in England was at St. Bees. Note: Some sources say it was 1823.

1822 Prototype lighthouse lenses were first made for Fresnel by Monsieur Soleil of Paris.

1822 Fresnel published his “Memoire sur Un Nouveau Systeme d’Eclairage des Phares” on July 29, 1822.

1823 First Fresnel first-order lens was approved by the lighthouse commission and installed on July 23, 1823 in the Cordouan lighthouse tower at the mouth of the Gironde River, in France.

1823 Pintsch's oil-gas tried at South Foreland lighthouse in England.

1823 Bordier-Marcet invents the ‘fanal a double aspect’ reflector.

1824 Fresnel completed the design of the first third-order fixed lens.

1824 Robert Stevenson traveled to France to see the Cordouan lighthouse and then ordered the first Fresnel Lens for use in Scotland.

1824 Fresnel and Arago completed the design of a gas burner for use with Fresnel’s lens.

1825 Fresnel completed the design of the first third-order fixed-flashing lens.

1825 French Chemist Chevreul patented the Stearin candle.

1825 Limelight invented by Thomas Drummond.

1825 Mercurial rotation was first proposed by Fresnel, but it was never built by him.

1825 The French lighthouse Commission adopted the exclusive use of the lenticular system of illumination and at the same time, the plan of Admiral De Russel for systematic placement of all major lighthouses.

1825 First use of a revolving light on a light-ship at the Nore Sand in England.

1825 François Soleil opens his factory for production of Fresnel lenses in Paris.

1825 Augustin Henry (later Henry-Lepaute) developed his first rotation clockwork for Fresnel.

1826 Fresnel completed the design of the first catadioptric lens.

1826 The Drummond Lime Light was first used in the Irish geological survey.

1827 First large catadioptric prism rings were built by Monsieur Tabouret in 1827 just before Augustin Fresnel's death.

1827 Experiments were made in 1827 with a lens proposed by Sir. David Brewster and made by Mr. Gilbert.

1827 Mr. Wilson of Troon first used the raising and lowering of the gas supply to produce a flash in a gaslight.

1828 Robert Stevenson proposes uniform system of buoy marking and color for use in the river Forth in Scotland.

1828 The first lens discs of fourteen inches diameter were produced by Georges Bontemps who later joined Chance Brothers of Birmingham, England.

1829 The Drummond Lime Light = 264 Argand lamps based on Trinity House experiments.

1829 Barcelona Lighthouse used gas from a natural pocket of hydrogen gas to light its lamps, but the gas gave out in 1838 and the light was converted to oil. This was first gas Lighthouse in America.

1830 Alexander Mitchell first invented the screw pile.

1830 Henry Lepaute invented the escapement lamp using two groups of alternating pumps with metal pistons.

1831 The Cookson Company, of Newcastle-Upon-Tyne, produced the first annular lens in England, from a single slab of glass using Buffon's design.

1832 The first dioptric lens in Norway/Sweden was in the lighthouse on the Isle of Oxoe.

1833 Mr. Oldham designed a replacement for the Carcel lamp in Scotland.

1833 Various lenses and chemical lights were tried in experiments by the Northern Lighthouse Board in Scotland.

1833 Trials of the Drummond Lime light were made in Scotland.

1833 Alexander Mitchell received his patent for the screw pile. It was first used at Malpin Sand lighthouse, in England, in 1841.

1834 Alan Stevenson proposed placing a segment of a spherical mirror behind (on the landside) of a fixed lens.

1834 Robert Stevenson experiments with Drummond's Limelight.

1834 Robert Stevenson began using Isaac Cookson of Newcastle to build improved revolving machinery.

1834 Alan Stevenson sent to France to acquire knowledge of the Fresnel system.

1834 Holyhead Harbor Light and Swansea in England lighted with oil-gas.

1835 Alan Stevenson proposes adding reflecting prisms below the lenses of Fresnel's revolving light. Design first built in 1843.

1835 Sir Goldsworthy Gurney proposed the Bude lamp in which a jet of oxygen gas is added to the oil flame. This made the flame far more brilliant but charred the wick.

1835 The first dioptric lens was installed in Scotland at Inchkeith, and was made by the Isaac Cookson Co.

1836 The first dioptric lens was installed in England at Start Point, and was made by the Isaac Cookson Co.

1836 First attempt to make a 1st order fixed dioptric drum in one piece (instead of 32 pieces as done in France) by Cookson in England, a manufacturer of mirrors at Newcastle-upon-Tyne. The French soon after made single piece drums of 2 meters diameter.

1836 Franchot invented the moderator lamp. The chief feature of the moderator lamp is its use of a spiral spring, which forces the oil upward through a vertical tube to the burner. This was much simpler in construction than a Carcel lamp.

1836 Faraday appointed scientific advisor to Trinity House.

1836 John Lake makes first proposal for use of iron in building a lighthouse, and suggested the use of the electric-arc lamp in lighthouses.

1836 Alexander Mitchell's first screw pile lighthouse at Maplin Sands, in England was the first iron Lighthouse built.

1836 Mr. E. Sang built small harbor light with diagonal astragals.

1836 The first Scottish dioptric fixed light was erected at the Isle of May, the work having been executed by the Isaac Cookson Co.

1836 Chance Brothers Glass works is founded in England.

1837 William Bush developed a patent for erecting a caisson for a lighthouse upon sand banks.

1837 Bude light proposed to be adapted for use in Lighthouse. Bude light produced by throwing oxygen into a flame of ordinary fatty oils.

1837 The first use of Coal gas on a pier in Troon.

1837 Wilkins invented the Pneumatic lamp where oil was raised to overflow the wicks through the use of air pressure.

1837 The first lightship on the Great Lakes was established in the Mackinaw Straits.

1837 A triangle chime is used as a fog signal at the West Quoddy Head Lighthouse in America.

1838 A Congressional Committee made a report recommending the importation and trial of two lenses from France and Captain Perry, of the United States Navy was assigned the task of traveling to France and procuring the lenses.

1838 Alexander Mitchell erects lighthouse at the Maplin Sands in England using his invention of screw piles. A fog bell is also installed.

1838 A fog bell operated by the tide was installed at the Whitehead Lighthouse in Maine.

1838 Jean Jacques François takes over the former Soleil lens works in Paris.

1838 Augustin Henry (later Henry-Lepaute) establishes his lens and clockwork factory in Paris.

1839 The Bude light trial at Orford Low lighthouse, in England.

1839 Henry N. Hooper Co. of Boston began building parabolic reflectors and lamps that were exact copies of the then current English design.

1839 Benjamin F. Willard invented a revolving light, using clusters of reflectors with revolving shields that produced a flash characteristic.

1839 I.W.P. Lewis develops a number of improvements in the design of the lantern room.

1839 Wilkins invented the hydraulic lamp, which used gravity feed to raise the oil to overflow the wicks.

1839 The first true American Light List was published. A much inferior version had been published by Winslow Lewis in 1817.

1839 The first buoy used on the Great Lakes was placed at the mouth of the Neenah River.

1839 James Timmins Chance joins Chance Brothers Glass works.

1839 Andrew Morse invented the Perpetual Fog Bell Striker first used at the Whitehead Lighthouse in America.

1840 Last Winslow Lewis magnifier lens removed.

1840 A test was made of B. F. Greenough's 'Chemical oil' lamp at the Boston lighthouse. This lamp burned Camphene.

1840 Experiments done showed that if an 8-beam lens was rotated at 40-60 rpm, a steady (fixed) light of approximately 6 times the normal fixed lens was produced.

1840 The first American lighthouse tender was placed in service.

1840 14 English reflector lights installed at Boston.

1840 Winslow Lewis had an iron die made that allowed him to make true parabolic reflectors.

1840 Thilorier invented an improved Hydrostatic lamp.

1841 The first Fresnel lenses installed in America at the Navesink Lighthouse in New Jersey. First order lens in south tower, second order lens in north tower, purchased by M. C. Perry.

1841 First experiments in Switzerland with submarine warning signals.

1841 The first use of Wood (Rosin) gas in the United States was at the Christiana Creek

Lighthouse using rosin gas made in a retort in a small building next to the lighthouse.

1841 A small-unmanned light vessel with only a fog bell was approved by Congress in America.

1841 First use of cast iron plates to create a lighthouse was by Sir Samuel Brown at a small tower at Gravesend Pier in England.

1841 Mr. Greenough patented a lamp burning Camphene for use in lighthouses.

1842 Experiment to see if lens revolving very rapidly could create a very bright replacement for a fixed light, but it did not work.

1842 First 3rd order lens with catadioptric prisms was at the Gravelines Lighthouse in England.

1843 First first-order catadioptric lens designed by Alan Stevenson, built by François Soleil and installed at Skerryvore lighthouse, in Scotland.

1843 First Lighthouse Libraries deployed in Scotland.

1843 Foucault first introduced carbon electrodes for arc lights.

1843 C. Wheeler, keeper at Thatcher's Island lighthouse, in America, invented the nurse lamp.

1843 Lard oil was tested at the Cleveland Light, in America.

1843 Dr. Potts, of England, patented the Pneumatic Pile a hollow cylinder of metal closed at the top and open below, placed upon the sand desired for a foundation, and forced down by exhausting it of air.

1843 Michael Faraday suggested the use of copper tubes to improve ventilation within the lantern room.

1844 Alexander Mitchell assigned his screw-pile patent to I. W. P. Lewis and a U. S. Patent was issued.

1844 Winslow Lewis and Benjamin Hemmenway patented an improved lighthouse lamp with features that continued in use for many years.

1844 Theodore Létourneau takes over the former Jean Jacques François lens works in Paris.

1845 Lieutenant Thornton Jenkins took a trip to Europe to review the light systems.

1845 Alan Stevenson suggests use of buoys with phosphorescent paint or a glass globe filled with such a preparation.

1845 Alan Stevenson experimented with Naphtha as a lamp fuel in Scotland.

1845 The pneumatic pile lighthouse was invented by Dr. Potts, and first tried at the Goodwin Sands in England.

1845 First electric arc lamp patented by Wright in England.

1845 Alexander Gorgon first suggested use of locomotive whistles in England as fog signals and proposed using reflectors to concentrate the sound.

1845 First cast iron lighthouse built by Gordon at Morant Point, Jamaica.

1845 Henry-Lepaute Sr. Invents the first lighthouse lamp suitable for burning mineral-oil, although mineral oil was not used in it at this time.

1845 J. W. Starr was given a patent, in England, for a carbon rod lamp bulb, where a carbon rod was placed into a vacuum inside a glass bulb and heated by electricity.

1845 Wagner invented his version of the pump lamp, which was a great improvement over the Lepaute Escapement lamp.

1845 Henry-Lepaute Sr. invents the improved Moderator lamp, which used a heavy piston to replace the spring operated Franchot version.

1845 Bucket lamps were still in use at the Cunningham Creek light in Ohio.

1845 Cookson Glass works, maker of Fresnel lenses in England, goes out of business.

1845 Sir David Brewster and others ask Chance Brothers to make Fresnel lenses.

1846 John de la Haye, of England, proposed construction of a skeleton lighthouse. It was Mitchell's screw pile lighthouse using Potts pneumatic piles. Minot's ledge lighthouse, in America (the first one) used pointed piles driven into the rocks.

1846 Coal fires still used at Nidingen in the Cattegat, in Sweden.

1846 Last use of Sperm oil in England at this time colza started in use.

1846 Kerosene was distilled from coal by Dr. Abraham Gesner, a physician from Cornwallis, Nova Scotia.

1847 Refined olive oil in use in Liverpool, in England.

1847 Alexander Gordon proposed a combination lens and reflector holophotal system.

1847 Coal Gas used in lighthouse at Hartlepool, in England, with gas burner invented by Mr. M' Neil.

1847 The first boat made of iron was used as a lightship at Merrill’s Shell Bank Louisiana.

1848 First attempt to create a standard system of Buoyage in America.

1848 George W. Smith developed improvements in lenses for revolving lights.

1848 Monsieur Georges Bontemps left Choisy-Le-Roi glass works in France and went to work for Chance Brothers, in England, where he was essential to Chance’s manufacture of optical glass.

1848 Létourneau proposed lengthening the duration of the flash in rotating lenses by dividing each flash panel into two vertical portions.

1848 Monsieur Tabouret, Augustin Fresnel’s assistant joins Chance Brothers.

1848 Electric lamp designed by Mr. Staite and Mr. Petrie, ran on batteries. Failed due to battery life and poor clockwork.

1848 The 1st order Fresnel lens for Carysfort Reef, in America, was purchased in France and was never claimed by Pleasonton from the New York Customs House. It was sold for scrap after a year or two and when the Government found out they entered a lawsuit to reclaim it. It was eventually assembled and put on display at the Franklin Institute in Philadelphia and later installed.

1848 The last use of coal in remote places.

1849 In the Cape Green Point, Cape Mouille and Cape Agulhas Lighthouses near the Cape of Good Hope in South Africa, sheep's tail oil was used. This oil was procured from the tips of the tails of the cape sheep.

1849 Thomas Stevenson invented the holophotal system using a reflector lens combination with a hemispherical metallic reflector, attached behind a truncated parabolic reflector. This reflector was used at the north harbor lighthouse at Peterhead, Scotland.

1849 Thomas Stevenson designed totally reflecting glass prisms formed into a hemisphere, the formula for this glass prism mirror were calculated by William Swan.

1849 A Compass Lamp with 8 wicks was still in use at the Vermilion Ohio lighthouse.

CHRONOLOGY FROM 1850 TO 1899

1850 The first total glass holophotal lens was proposed in March 1850, and was built by John Adie who was an optician.

1850 An Act of Congress provided for the systematic coloring and numbering of all buoys used within the United States.

1850 The first screw pile lighthouse in America was installed at Brandywine Shoal.

1850 The first iron buoys in America were installed at Little Egg Harbor, New Jersey.

1850 Jacob Custer invents early clockwork driven fog-bell striker in America.

1851 The Lighthouse Board was established the review the U. S. Lighthouse System.

1851 The Horsburgh lighthouse in Singapore was fitted with 9 holophotal reflectors designed by Thomas Stevenson.

1851 Celadon L. Daboll invented the reed-horn fog signal.

1851 On March 3, 1851 Congress directed that "hereafter, in all new lighthouses requiring new lighting apparatus, and in all lighthouses as yet unsupplied with illuminating apparatus, the lens, or Fresnel system, shall be adopted."

1851 Thomas Stevenson placed the first apparent light in operation at Stornoway Bay in Scotland.

1851 Chance Brothers of Birmingham built its first Fresnel lens.

1851 On of the early clockwork driven fog-bell strikers was developed by the Lowell Machine Shop in America.

1852 Louis Sautter buys the former Létourneau Lens Works in Paris.

1852 Charles Babbage developed a plan for distinguishing lights with a numerical system of occultation.

1852 Professor John Adie constructed the first spherical prism mirror based on a proposal by Thomas Stevenson in Scotland.

1852 The Lighthouse Board was organized and replaced Stephen Pleasonton in controlling all of the Lighthouse Establishment in America.

1852 First true bell buoy was invented by Lt. Brown of the US Lighthouse Service.

1853 Jabex Stone's patent buoy was tested by the Lighthouse Board.

1853 The Jones Fog Bell Company installed their first clockwork driven fog bell at the Whitehead Lighthouse in America.

1853 George G. Meade invented an improved hydraulic lamp.

1854 The plan of Charles Babbage for distinguishing lights was tested by the Lighthouse Board.

1854 Steam whistle fog signal invented by Robert Foulis in Nova Scotia.

1854 George Herbert designed buoys with their mooring chains located at their center of gravity which Trinity House began using. Herbert also designed a floating lighthouse.

1854 The bell buoy was first used in America.

1854 Augustin Henry becomes Augustin Henry-Lepaute.

1855 A fog cannon was placed at the Point Bonita lighthouse in San Francisco and was the first fog signal on the Pacific coast.

1855 Chance Brothers of Birmingham began to produce lenses.

1855 The United States Lighthouse Board first experimented with mineral oil (kerosene).

1855 The Lighthouse Board investigated the use of steam whistles as fog signals.

1856 Frenchman Monsieur Maris invented a single wick lamp that could burn kerosene.

1857 V.L.M. Serrin invented an arc lamp with automatic adjustment of the carbon rods through the use of both clockwork and electrical solenoids.

1857 The first use of electricity by the Trinity House in England set up experimentally in the South Foreland Lighthouse.

1857 The Lighthouse Board purchased its first side-wheel steamer tender the *Shubrick*.

1858 Gardiner and Blossom got the first American patent for an electric incandescent lamp.

1858 C. W. Harrison invented an arc lamp where the positive electrode was a cylinder made of carbon that turned beneath the negative carbon rod to make regulation of the distance between the poles easier.

1858 Brooklyn Flint Glass Company proposed the use of their pressed-flint-glass lenses for lighthouses. In 1858 they produced a very small number of pressed flint-glass sixth-order lenses.

1858 J. W. D. Brown, in England, proposes the use of superimposed (Bi-form) lenses. They are not tried.

1859 All lighthouses in America were converted to the use of the Fresnel lens except for two.

1859 Professor Justus von Liebig invented a method of coating the back of glass reflectors with pure silver; increasing their reflecting properties up to 91% light reflection.

1859 The first lens pedestal with an integrated rotation clockwork was delivered by Henry-Lepaute to the Dagerort Lighthouse in Russia.

1860 Celadon L. Daboll panted the compressed-air-fog horn in America.

1860 The first use of porcelain reflectors plated with platinum at the Sunderland lighthouse in England.

1860 Joseph W. Swan first developed the electric filament light bulb.

1861 Linseed oil and peanut oil were tried as a fuel for lighthouse lamps in France. They were found inferior to other fuels.

1861 John Wigham invents an early lighted buoy used on the River Clyde in Scotland.

1862 The first practical use of electricity at the Dungeness Lighthouse.

1862 Frederick Barbier and Stanislas Fenestre form Barbier & Fenestre to make Fresnel lenses.

1863 The first use of electricity in France at Cape La Heve lighthouse.

1863 Captain William B. Franklin invented an improved hydraulic lamp for use in fourth, fifth and sixth order lenses.

1864 U. S. begins use of Lard Oil and introduction was by Professor Joseph Henry. From 1864 through 1884, Lard oil was in general use in U. S. because it was cheaper than Colza or Sperm oil.

1865 The John Wigham gas system and Crocus burner put into use at Howth Baily, Dublin Ireland.

1865 Carl Gustaf von Otter, invented Venetian Blind style shutters worked by clockwork to create a flashing characteristic.

1866 The first American experiments were made with the arc lamp and electricity.

1866 Werner Siemens invented the dynamo generator, in Germany.

1867 Lard oil became the principle fuel used in the U. S.

1867 Sautter Lemonnier & Cie. developed the first spherical mirror for use with the arc lamp in France.

1867 The Lighthouse Board first experimented with fog sirens.

1867 Professor Holmes perfected his Dynamo-Electric generator.

1868 The Corning Flint Glass Works is established in America.

1868 Captain H. H. Doty invented burner changes allowing the burning of Mineral oil in all current burner sizes including first through third order which could not previously use mineral oil (paraffin or kerosene).

1868 Magnesium was tried as a lighthouse illuminant in America.

1868 John Wigham in Ireland invents the Composite gas Burner with 108 gas jets. It is installed at the Howth Baily Lighthouse.

1868 John Wigham in Ireland invents a clockwork control for his Composite Gas Burner creating what was called the “Intermittent Burner” when used inside a fixed lens.

1869 Paraffin (also known as Schist oil and Kerosene) replaced Colza and Sperm oil as the fuel used in Scottish Lamps.

1869 Joseph Funck invented an improved hydraulic lamp with a float to control oil flow to the burner.

1869 The George M. Stevens Company makes its first clockwork driven fog-bell striker.

1869 The first lighthouses to be equipped with steam whistles in America were West Quoddy Head and Cape Elizabeth Maine.

1869 Pintsch buoys first used in Suez Canal.

1870 H. H. Doty received a United States Patent no. 109,303 for his invention of ‘Improvement in Apparatus for Burning Paraffin and Other Hydrocarbon-oils’ on November 15, 1870.

1870 Doty showed his kerosene lamps to David and Thomas Stevenson in Scotland, and they put one of his lamps on trial at the Girdleness lighthouse.

1870 Trinity House developed a single-wick-kerosene lamp.

1870 Joseph Funck an engineer with the Lighthouse Service was working on lamp improvements to allow the use of Mineral Oil.

1870 Paul Lemonnier forms partnership with Louis Sautter creating the Sautter-Lemonnier Company.

1871 Trinity House engineer, James Douglass completed the design of his first multi-wick lamp for burning kerosene.

1871 John Wigham invents the “Group-Flashing Burner” using his intermittent burner inside a flashing lens at the Rockabill Lighthouse in Ireland.

1872 John Wigham in Ireland first used a Superimposed (Bi-form) lens.

1872 John Wigham first proposes the Hyper-radial lens and the French firm Barbier & Fenestre begins the first designs.

1872 Chance Brothers hires Dr. John Hopkinson as its Scientific Advisor.

1873 The initial use of Kerosene (also known as mineral oil or Paraffin) in U. S.

1873 A second study of the potential use of Mineral Oil was made in 1873 because of the cost of Mineral Oil being much less than Lard Oil.

1873 Professor Ferdinand Osnaghi, of Vienna Austria, developed an improved holophotal reflector for use with the electric arc lamp.

1874 The “Group Flashing Lens” was invented by Dr. John Hopkinson, in England. The group flash was made by splitting up the lens into several portions to give a group of two or more flashes in quick succession.

1874 French Colonel Alphonse Mangin invented the Mangin mirror, a lens mirror hybrid used to produce the effect of a parabolic mirror.

1874 Joseph Funck was assigned to analyze American lamps for any design changes needed to burn kerosene.

1874 The first catadioptric Fresnel lens for use on a lightship was delivered to Sweden by Henry-Lepaute.

1875 The first request by the Lighthouse Board for the construction of libraries for the keepers.

1876 First 50 Keeper’s Libraries constructed and put in use, in America.

1876 Use of Kerosene held up by H. H. Doty's patent for mineral oil lamps.

1876 First trial of the J. M. Courtenay 'Whistling Buoy.'

1876 Joseph Funck invented the constant-level lamp used in projector (range) lights.

1876 Joseph Funck was given a patent for his kerosene burner in America.

1876 Julius Pintsch's first lighted buoy installed in Finnish Gulf.

1877 The invention, in Germany, of a carbon rod for use in arc lamps with a soft graphite core.

1877 John Wigham in Ireland creates the first superimposed 4-high quadri-form lens for the Galley Head Lighthouse.

1877 Barbier & Fenestre, in France, creates the first drawings for a Hyper-radial lens.

1878 Kerosene used heavily in the United States.

1878 First use of the Pintsch oil-gas in a light on a buoy, in England. The buoy was placed in the Thames Estuary off Sheerness.

1878 A major electrical arc lamp installation was completed at the Lizard lighthouse in England.

1878 The U.S. Government wins its case against H. H. Doty allowing it to use Joseph Funck's design for kerosene lamps.

1879 The Lighthouse Board first experimented with the Topophone to locate fog signals from a ship.

1879 Thomas Edison receives patent 223,898 for an incandescent lamp bulb with a filament made of carbonized cotton thread.

1880 Dr. Hopkinson removed the outermost catadioptric reflecting prisms and replaced them with refracting-only prisms made of dense flint glass to allow greater angles of refraction in these first order and larger lenses.

1881 C. R. Nyberg and G. W. Lyth designed an oil-gas buoy lamp that worked unattended for 10 days.

1882 L. F. Lindberg designed light screens that used heat from the lamp to rotate around the lamp producing flashes.

1882 All American lightships after No. 44 built in this year, were built of iron or steel.

1883 First unattended lighthouse built at Pillau in Poland using Pintsch gas.

1883 An automatic occulter produced flashes by controlling the gas passing from the reservoir to the burner on a Pintsch gas system.

1883 First use of mineral oil (Kerosene) in a first-order lens in the United States at the Navesink Twin lights.

1883 The start of trials to find the best form of electricity generator and arc lamp to use in lighthouses was conducted at the South Foreland lighthouse in England.

1883 The first Gamewell automatic fog-bell striker is developed.

1885 Kerosene became the principal fuel for US Lighthouses.

1885 Incandescent gas mantle invented by Carl Auer von Welsbach in Vienna.

1885 A major test of the relative properties of oil, gas and electricity for lighthouse illumination was held at the South Foreland Lighthouse in England.

1885 Joseph Funck invented the 8-day lamp for use on rivers and pierheads.

1885 The first Hyper-radial lens panels were made by Barbier & Fenestre for Messers. Stevenson and were tested at the South Foreland light using a ten-ring gas-burner that were nearly twice as powerful as a standard first-order lens using the same burner.

1886 The Statue of Liberty, in America, was first lit with electricity using an arc lamp.

1887 Chance Brothers produces its first Hyper-radial lens.

1887 Stanislas Fenestre dies and Barbier & Fenestre becomes F. Barbier & Co.

1888 Joseph Funck invented an improved fourth-order lamp with a flame-spreader button.

1888 The first American buoy to be lit with electricity using an incandescent bulb was at Gedney's Channel.

1889 The use of electricity and the incandescent bulb was demonstrated at the Lighthouse at Sandy Hook, New Jersey.

1889 A kerosene lamp was developed for use in an unattended buoy.

1889 David Heap improved the 8-day Lamp by using an Argand style burner and a cut glass lens. He also invented the 5-day Lamp.

1890 Leon Bourdelles, in France, invented the mercury float system for lens rotation.

1890 David Heap invented the Twinkling light, which used Venetian blinds to provide a characteristic for American lights.

1890 David Heap invented an eclipser mechanism for use in harbor lights in America.

1890 Sautter Lemonnier becomes Sautter Harlé when Harlé joins the firm.

1891 Permanent wick lamps were introduced in France.

1891 David Heap's twinkling light was first installed at the Fairhaven Bridge light in Massachusetts.

1891 A mechanism for revolving the lamps about the mast, to obtain a flashing light was tried on American lightships, but was a failure.

1891 The first American lightships to be self powered were built.

1892 Acetylene process invented by Leopold Willison in Canada.

1892 Kerosene was the only fuel in use in the United States.

1892 David Heap and Joseph Funck invented the Funck-Heap lamps for use in fourth, fifth and sixth-order lenses, which became the American standard kerosene lamps.

1892 David Heap invented the use of red cylinders to replace red chimneys.

1892 The first American lightship lit with electricity was the *Cornfield Point*, No. 51.

1892 John Wigham in Ireland proposes the "Giant Lens" one and one-half times the size of a Hyper-radial lens. One is built by F. Barbier, but never installed in a lighthouse.

1893 David Heap began using ball bearings to replace chariot wheels.

1893 In co-operation with Julius Pintsch, Gebr. Picht & Co. delivered its first complete Fresnel lenses.

1894 F. Barbier & Co. becomes Barbier & Bénard and continues to make Fresnel lenses.

1895 The Benson-Lee Automatic Lamp was developed in Europe and chosen for installations in Scotland. It used a wick tipped with tar that required no trimming for 4 to 5 days.

1896 A method was developed, in France, to store compressed Acetylene by dissolving it in Acetone held in steel cylinders.

1896 Wilhelm Weule produces its first lens products in Germany.

1897 David Heap, in America, invented a buoy using acetylene gas.

1898 The first true American lighthouse lit with electricity was at Navesink, NJ.

1898 South Tower of Navesink Lighthouse electrified using an arc lamp.

1898 A Luchaire Incandescent oil vapor lamp was first used at L'lle Penfret lighthouse in France.

1899 David Heap invented the Heap Air Pressure Lamp, which was pumped up with a bicycle pump.

CHRONOLOGY AFTER 1900

1900 Acetylene gas was first used at the Cloch lighthouse in Scotland.

1901 Radio communication was experimented with on the Nantucket Lightship in America.

1901 Arthur Kitson invented a burner in which, instead of the oil being vaporized at the wick and burnt as an open flame, it was converted into vapor under pressure in a retort and then mixed with air in a mixing chamber to form a gas for heating an incandescent mantle.

1901 Barbier & Bénard becomes Barbier, Bénard & Turenne – BBT lens makers.

1902 Diaphone foghorn was invented by J. P. Northey in Canada.

1902 First beacon light using non-compressed acetylene installed on the Mobile Channel in America.

1902 Sir Thomas Matthews, Chief Trinity House Engineer, improved the design of the Kitson I.O.V. lamp.

1902 The Heligoland lighthouse in Germany began using Mangin mirror searchlights for illumination.

1902 C. W. Scott developed an I.O.V. lamp in Ireland.

1903 Compressed acetylene gas was first used in America at the Jones Rocks beacon in Connecticut.

1903 A parabolic cylinder mirror was installed at the Travemünde lighthouse in Germany.

1903 The Lighthouse Service was transferred from the Treasury Department to the Commerce Department.

1904 A Luchaire I.O.V. lamp was first used in America at Sandy Hook lighthouse.

1904 Canadian, Leopold Willson generates Acetylene gas inside a buoy.

1904 AB Gasaccumulator Company (AGA) is formed by the take over of the former Carbid Co. and Dalén was employed as a Consultant Engineer.

1904 John Höjer approached the Gasaccumulator Company (later called the AGA) to try to solve some of the problems in the use of Acetylene.

1904 Sir Thomas Matthews invented the triple-mantle I.O.V. lamp in England.

1904 The lightship Nantucket was permanently equipped with radio communications.

1904 Chance Brothers took the design of the Incandescent Oil Vapor (I.O.V.) lamp that had been invented in France in 1898, and improved its design.

1905 One of the last Vippefyres to be used was as a small local light on the island of Gothland in Denmark.

1905 Gustaf Dalen invents the AGA flasher.

1905 The Germans (Prussians) invented the Differential Arc lamp.

1906 Dalén was employed fulltime as the Chief Engineer at AGA. Acetylene was also known at that time as Dalén gas.

1906 Dalén invents the AGA compound to produce safer acetylene gas cylinders.

1906 The U.S. Lighthouse Service first began using submarine bells as fog signals.

1906 Two acetylene gas buoys using the self-generating method of gas production were placed in service in America.

1907 Dalén invents the acetylene pressure regulator.

1907 Dalén invents the Sun-valve.

1907 The first use of the Dalen sun-valve was made at the Furuholmen lighthouse in Sweden.

1909 Raymond Haskell developed the spherical-glass-split-mirror reflector-lens combination in America.

1910 Chance Brothers triple Mantle IOV burner introduced in England.

1910 The Lighthouse Bureau asked Macbeth-Evans Glass Co. to produce a fifth-order lens in America for use on lightships.

1910 The Lighthouse Board was terminated and the U.S. Lighthouse Service became the Lighthouse Bureau.

1910 A buoy using compressed acetylene gas was installed in the Ambrose Channel in New York.

1911 Sirens were tried in place of whistles on American lightships.

1913 Macbeth-Evans produced the first fourth-order lens made in America.

1913 The Bush Bluff lightship, in America, was fitted with a revolving parabolic reflector mounted on a gimbaled arm, using an incandescent electric light bulb.

1915 The first use of the diaphone fog signal in America.

1915 Dalén invents the lightship lens pendulum.

1915 The first use of an oscillator fog signal on a lightship in America.

1916 The first use of flashing acetylene lights in America on the Mississippi River.

1916 The first use of automatic light bulb changers in America.

1917 Gustaf Dalen invents the automatic mantle changer.

1917 A thermostat was developed by the Lighthouse Bureau to warn keepers by ringing a bell when fluctuations occurred in the I.O.V. lamp.

1917 A post lantern with an automatically occulting light was designed by the Lighthouse Bureau.

1917 The first experimental radio beacon for determining location was set up in America.

1920 The Tyfon fog signal is invented in Sweden by H. Rydberg.

1921 David Hood improves the Kitson burner with an autoform mantle.

1921 First use of a radio beacon on the light vessel 'Ambrose' at the approach to New York Harbor.

1921 A long operating time fog-bell striker was developed and sent to Fort Adams Light in Rhode Island in America.

1922 The first electric filament lamp installed at the South Foreland lighthouse in England.

1922 A gong buoy was designed by the Lighthouse Bureau in America.

1922 The Lighthouse Bureau began to produce its own acetylene lanterns rather than buy them from outside manufacturers.

1923 The fog valve (hygroscopic fog detector) was invented by F. C. Hingsburg of the United States Lighthouse Service.

1925 The first radio fog signal on a lightship on the Great Lakes was installed on the Huron lightship.

1926 Dr. Genthe Glass was founded to assist the Wilhelm Weule Company.

1928 The use of reflectors that were chrome plated was tried for those sites still using reflectors.

1928 Neon filled light bulbs were tried for lighthouse use in America.

1928 The first automatic radio beacon was installed in America.

1929 The first synchronized radio beacon and air fog signal was installed at Cape Henry Virginia.

1930 An alternative to dioptric apparatus is the use of large segmental silvered glass parabolic mirrors arranged around a common light source. This idea was developed by Charles Stevenson.

1933 A photoelectric alarm system was developed in America to check the operation of unattended lights.

1934 The first radio-controlled lightship is placed in service in America.

1934 By this date nearly all of the Pintsch Gas buoys in America had been converted to acetylene.

1936 A battery powered solenoid-operated fog bell striker was installed at Peshtigo Reef Light Station in America.

1936 Macbeth-Evans Glass Company merged with the Corning Glass Company.

1937 A 375mm.-duplex lantern was designed for use on a single-masted lightship in America.

1937 Fog signals remotely controlled by a modulated light beam were tested in America.

1938 The Lighthouse Bureau radio laboratory was completed.

1939 On July 1, 1939 Congress merged the Lighthouse Bureau into the United States Coast Guard.

1939 On July 7, 1939 the Lighthouse Bureau went out of existence.

1947 Xenon discharge lamp was used for the first time in a lighthouse in England.

1952 Henry-Lepaute factory in Paris burns down. New factory established in Littre au Mesnil-le-Roi.

1955 The navigation aids portion of Chance Brothers is sold to Stone Holdings forming Stone-Chance.

1958 First prefabricated telescopic lighthouse with a caisson was erected at Grunkallen in Sweden.

1958 The first lighthouse with a helicopter-landing pad at Grundkallen Sweden.

1965 The Airchine foghorn invented in Canada to replace the Diaphone.

1970 Sautter Harlé is absorbed by Alsthom and no longer makes navigation aids.

1972 The last member of the Henry-Lepaute family leaves the business.

1977 The last paraffin burner in operation by the Trinity House in England was replaced by an electric light and that burner is now on display at the Trinity House's National Lighthouse Museum in Penzance.

1977 Stone-Chance is sold to AGA (AB Pharos).

1981 Barbier, Bénard & Turenne - BBT is merged into CIT ALCATEL.

1983 The Nantucket Shoals Lightship was replaced with a large buoy. This was the last U.S. Lightship in operation.

1984 AGA Navigation Aids is sold becoming AB Pharos Marine.

1985 CIT ALCATEL sells the former BBT forming GISMAN.

1985 Lightship Nantucket I decommissioned. This was the last Lightship owned by the U.S. Government.

1989 Automatic Power is merged with AB Pharos Marine.

1990 GISMAN owner of the former BBT becomes Samtec-GISMAN.

Other Historical Information (/history/lighthouse-general-information)